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ABSTRACT

This paper is intended to provide a brief introduction to how economists assess the importance of education and training in the Australian economy and how the allocation of resources to education can be assessed. Included in the introduction are statistics illustrating the enormous impact of education and training on Australia's economy and a discussion of possible reasons individuals, employers, and governments allocate resources to education and training. Basic distinctions between compulsory and postcompulsory education, general and vocational education, preemployment education and employment-related training, and general and specific training are drawn in part 2. The following considerations in assessing governments' role in allocating resources to education and training are discussed in part 3: efficiency and equity arguments; funding and provision options open to governments; and the Australian government's role in the provision, finance, and regulation of education and training. Part 4, which is devoted to the problem of treating education and training as investments by using the human capital model, examines the following topics: stocks and flows; measures of human capital; key linkages; and rates of return. Part 5 describes a process for assessing the contribution made by education and training to economic performance. The document contains 48 references. (MN)

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WORKING PAPER NO. 2

THE ROLE OF EDUCATION AND TRAINING IN THE ECONOMY

Leo Maglen
September 1995

MONASH UNIVERSITY - ACER

CENTRE FOR THE ECONOMICS OF EDUCATION AND TRAINING

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THE ROLE OF EDUCATION AND TRAINING IN THE ECONOMY*

Leo Maglen
September 1995

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1. INTRODUCTION

This paper aims to provide a brief introduction to and an overview of the way in which economists assess the importance of education and training in the Australian economy, and of how the allocation of resources to education and training can be assessed.

Education and training are big business — by almost any yardstick. Large numbers of people devote themselves full-time to education and training activities, many more do so on a part-time basis. Many institutions, both large and small, specialise in the delivery of education and training services. Export of these services now contributes substantially to our balance of payments. Governments devote sizeable portions of their annual budgets to education and training, and the overall effort by both governments and the private sector in education and training constitute a substantial part of our Gross Domestic Product.

A few figures suffice to give some idea of the size of the enterprise:

- An estimated 5 million students enrolled in education courses in Australia in 1994 (Burke 1995);
- 100 percent of those aged 5 to 14 attend schools and colleges;
- approximately 49 percent of those aged 15-24 were enrolled in education courses in 1992 (ABS 1992);
- 531 thousand were employed in the education sector in 1995 (ABS 1995);
- 339 thousand were employed as teachers, lecturers and instructors in 1995 (ABS 1995);
- total government outlays on schools, TAFE colleges and universities in 1992-3 were $21.5 billion, or 5.3 percent of GDP (Burke 1995);
- an estimated 47 percent of wage and salary earners undertook some form of formal study or training in 1993, and about 86 percent claimed to have received some on-the-job training over the same period (ABS 1993a); and
- estimated employer expenditure on formal training between July and September 1993 was $1.1 billion (ABS, 1993b).

Three parties are largely responsible for allocating resources to education and training:

- **students and trainees** (and their families);
- **employers** (in both the public and private sectors); and
- **governments** (federal and state, but not, to any great extent in this country, local).

The reasons why they do so vary enormously, both within and between these groups of contributors. Listings of the possible reasons why each is involved typically include the following:

For individuals and their families:

- they are compelled to
- peer group and social pressures
- being a student is better than working
- the alternative may be unemployment
- the learning environment is stimulating and challenging
- the acquisition of knowledge and ideas is good in itself and is of lasting satisfaction
- the skills acquired enable them to get better jobs, ones that pay more, are more secure, and are more interesting
- the qualifications acquired enable them to get better job, ones that pay more, are more secure, and are more interesting
- education and training give them more flexibility, greater access to lifestyle choices.

For employers:

- more educated workers are more skilled, hardworking, disciplined, and adaptable
- better trained workers are more productive and more able to cope with technological change
- expenditures on education and training programs attract government subsidies and/or tax concessions.

For governments:

- education and training are electorally popular and 'safe' areas of public expenditure
- education and training are crucial to the pursuit of social welfare objectives of equality of access and opportunity, a more equitable distribution of income and poverty alleviation
- education and training are crucial to job creation and unemployment relief programs
- education and training are vital to the country's economic growth, its capacity to be internationally competitive.

For economists, motives for allocating resources to education and training can be grouped into three broad categories. These activities are valued because they are:

(a) **consumption goods** — adding directly to utility;

(b) **intermediate goods** — contributing to the pursuit of larger objectives; and/or

(b) **investment goods** — adding directly to productive capacity.

To a greater or lesser extent, all three major groups of decision-makers categorise education and training in these ways. However, while students, trainees and employers are motivated by self-interest in their decision-making (and, indeed, are encouraged to do so) governments must be seen to be acting solely for the best interests of society as a whole. They are charged with ensuring that resources allocated to education and training are used efficiently

and equitably. The application of these latter criteria, and the options they present for government participation in resource allocation to education and training, are reviewed in a later section of this paper.

It is, however, the idea that education and training are a form of investment for individuals, employers and society as a whole, that has over the last thirty years or so most intrigued economists. It led to the development of a whole new branch of economics, *human capital theory*, and has served as the focus for attention in the assessment of the economic role of education and training. Before we take a closer look at the idea of education and training as investment activities, however, a few fundamental distinctions need to be highlighted. The following section draws upon Maglen (1993).

2. SOME BASIC DISTINCTIONS

2.1 Between Compulsory and Post-Compulsory Education

The requirement that education should be compulsory between the ages of 5-6 and 14-16 has for a long time provided the base-load of educational systems in this country and elsewhere. Introduced by government to give a basic equality of access to education for all, and to ensure that all adults in the community have a minimal literacy, numeracy and familiarity with the fundamental norms and institutions of our society, it is an imposition that is deeply entrenched and rarely challenged. (The only arguments centre around whether the minimum school starting and leaving ages should be raised or not.)

Post-compulsory education — undertaken on a voluntary basis at the senior secondary and tertiary levels — presents individuals and society with choices as to the amount and type of education undertaken. It is here that the bulk of the educational expansion that this country has experienced in recent decades has taken place.

On a per-student basis post-compulsory education is more costly than compulsory education, for two reasons: (a) because more advanced courses are generally more expensive to put on than more elementary ones; and (b) because the opportunity cost of the students' time enters into the calculation at the post-compulsory level. By definition it is zero below the minimum school leaving age.

2.2 Between General and Vocational Education

Much debate surrounds the relative merits of education that is based on broad general principles, and that which is targeted towards specific occupations and/or industries. General education is discipline oriented and takes students to progressively more advanced levels of appreciation and understanding, in such fields as mathematics, languages, literature, science and the humanities. Vocational education on the other hand is more practical, task-oriented, and is tailored to the particular skills and knowledge required to perform in specific areas of employment. Courses in accountancy, medicine, plumbing, computer programming and dressmaking fall into this category.

Education of this latter type is often considered more economically valuable because it is more directly 'relevant' to the requirements of employers, and hence much more attuned to national interests. Skills and knowledge that are immediately applicable are, by their very nature, much more likely to enhance the competitive position of the country than are those whose worth seems much more esoteric and obscure, and whose practical significance is not

immediately apparent.

The planning of general education programs requires identifying those disciplines that are considered appropriate to the well-rounded intellectual development of the individual, and then ensuring that it is available to all who seek it. Planning vocational education programs, on the other hand, requires detailed knowledge of the specific skill and knowledge requirements of the particular occupation or industry targeted, *and* of the number of extra workers with those particular skills and knowledge that are likely to be required by that occupation or industry, *well in advance of requirements*. By their very nature, vocational education programs require much more frequent monitoring and upgrading than do general education programs if they are to be effective. Vocational education programs, as a rule, are more costly than equivalent size general education programs. Again, by its very nature, the relevance of vocational education diminishes rapidly the further away from the targeted occupation or industry it is applied. General education, while nowhere being absolutely spot on, is nonetheless much more portable.

2.3 Between Pre-Employment Education and Employment-Related Training

Up to this point, education and training have been talked about in tandem, as if the two terms are synonymous. They are of course closely related and the line between them is often difficult to detect. However, as a working rule education can be taken to mean formal instruction in purpose-built institutions such as schools, colleges and universities, the bulk of whose courses are undertaken by students on a full-time basis prior to entry into the workforce. These courses can be either general or vocational in orientation.

Training, on the other hand, can be viewed as instruction that is directly related to the employment activities of the trainees, and usually given in their places of employment. But even if all or part of it is conducted outside — in TAFE colleges, schools, universities or wherever — training is usually initiated and/or sponsored by employers, as say via Industry Training Advisory Boards. Examples of training programs range from informal on-the-job 'sitting by Nelly' type training to tailor-made short courses run by university business schools. Apprenticeship schemes fall into this category, so too do cadetships, sandwich courses, in-service upgrading programs. Education programs, even vocational ones, by definition anticipate the skill requirements of particular employers. Training schemes on the other hand should be able to respond to them. As such employers are in a better position to determine the content of them than are educationalists.

2.4 Between General and Specific Training

The American economist Becker (1964) first drew attention to the distinction between general and specific training. General training is any training that imparts skills and knowledge useful not only to the firm in which the training is undertaken, but to its rivals as well. That is, it is capable of raising the trainees' productivity whether they choose to stay with the training firm or seek employment elsewhere. Specific training on the other hand imparts non-transferable skills and knowledge, those that are applicable only in the training firm. It raises the trainees' productivity only if they stay put, and is of no use to any other firm.

Apprenticeships are a good example of general training, while learning how to operate and maintain machinery on systems peculiar to a particular firm is an example of specific training. A lot of training obviously has characteristics of both — as for example in learning

word-processing in a firm using a software package that is different from that used elsewhere.

Note that this distinction is not the same as that between general and vocational education. Training can be either general or specific, but pre-employment education, even if it is higher vocational, cannot, by definition, be specific to any particular employer in the manner described.

The importance of the general/specific distinction to Becker lies in determining who will pay for the training — the trainee or the training firm. It depends upon who is in a position to get a return on their investment. All other things being equal, in a competitive labour market, this is the training firm in the case of specific training and the trainee in the case of general training. The firm will therefore finance the former but the trainee must bear the cost of the latter. Other things are rarely equal, however, and in the face of significant imperfections in labour markets, much of the significance of the distinction is lost (see, for example, Borland 1990).

3. ASSESSING THE ROLE OF GOVERNMENTS IN THE ALLOCATION OF RESOURCES TO EDUCATION AND TRAINING

The obvious question that arises from the observation that there are three key decision-makers in the allocation of resources to education and training is what is the appropriate mix of provision and funding between them. To what extent should students/trainees pay for education and training they undertake; how much training should employers provide and how much should they fund; and what should be the role of government in all of this?

The starting point for most economists is that market forces should be the means by which resources are allocated to education and training — and that governments should play no role at all, other than to ensure a 'level playing field'. That is, in education students should be free to choose between educational packages offered by a large number of private full-fee charging schools, colleges and universities, all competing against one another. This should ensure that everyone gets the education they want and can afford, and that education is produced as efficiently and cost-effectively as possible. Similarly training would be provided by firms for their employees with the costs of doing so being shared between the firm and the trainees on the basis, described above, of the extent to which the training is either general or specific in nature.

That this is not the case, for either education or training, in Australia or indeed in any other country, suggests of course that there is a widespread conviction that markets, without substantial support from governments, would fail to allocate resources in either an efficient or equitable manner. The *extent* of the support advocated by economists varies according to how seriously they consider markets would fail if left to themselves, and the *form* of the support recommended varies according to the manner of the perceived failure and with what is considered necessary to overcome the problem.

Governments can intervene in the allocation of resources to education and training in one or other or a combination of three ways:

- by *providing* education and training through their own schools, colleges, universities and training establishments;
- by *financing* education and training either through the providers or, directly, through

the students/trainees; and/or

- by *regulating* resource allocations to education and training.

3.1 The Role of Government in Education

(a) Efficiency and Equity Arguments

It could be claimed that open, unregulated, unsubsidised markets for education would fail to allocate resources in an efficient manner on the following grounds:

- there is widespread consumer ignorance, parental incompetence;
- education is a natural monopoly;
- education generates significant externalities in production and consumption; and because
- education can be regarded as a public good.

(i) Consumer Ignorance

The value of education cannot be assessed by consumers until they experience it for themselves. *A priori* it is difficult, if not impossible, and education can be truly said to be an acquired taste. When it comes to education, those who are ignorant, illiterate and innumerate are not in the best position to judge what is in their own best interests, or those of their children. If left to themselves significant numbers would probably choose to remain ignorant, illiterate and innumerate and to consign their children to the same fate. This was a powerful consideration in the original decisions taken last century in Australia and elsewhere to make basic education compulsory, and ensure its effectiveness by making available free public instruction. Whether this is still a good argument for public intervention at the primary and lower secondary levels of schooling, and whether it was ever an argument for public intervention at the higher levels, is debatable.

(ii) Natural Monopoly

A natural monopoly is created in the presence of substantial economies of scale in production, such that, given the size of the market, only one producer with something approaching a one hundred per cent market share would be in a position to take full advantage of them. A competitive market in which there were more than one producer, under these conditions, would be inefficient; generating higher unit costs and unnecessary and wasteful duplication of facilities.

Public utilities such as town water supply and sewerage disposal are cited as examples. They are publicly provided and/or heavily regulated to protect society from the unrestrained profit seeking that the private monopolist could pursue in these situations.

Can we add education to the list? Something like a natural monopoly argument was used in the last century in Australia to justify governments setting up systems of small, often one-teacher, schools to service remote areas of the country. However, increased mobility has since greatly weakened that case, and it was never a pressing one in the cities and more closely settled areas.

There may well be some economies of scale to be obtained in large education institutions and through wide-ranging education systems, but whether lower unit costs (if they are achieved) means greater cost-effectiveness is problematic. Certainly a continuing and generalised case for government provision of education is hard to sustain on this basis.

(iii) Externalities

Externalities — in the case of education largely external or 'spillover' benefits — are effects of market transactions that individuals and groups other than those party to those transactions are able to enjoy. In that sense they come as 'free goods' to these recipients, but, because they are not 'captured' by the parties themselves, may be ignored by them in their decision-making.

Private consumption benefits of education are obviously captured by the students themselves, and as such it is argued that they should be prepared to pay for them. Moreover, if the higher earnings more educated workers on average receive can be regarded as reward for their greater productivity (and hence bigger contribution to economic growth) then students also capture this benefit and as such there is no case for society compensating them further by subsidising their education.

Only uncompensated benefits springing from their extra education can be described as spillover benefits or 'externalities'. Effects such as producing a more civilised, urban, cosmopolitan, tolerant, environmentally aware, politically sophisticated society, that everyone including the less educated can enjoy, fall into this category. So too can the flow-on effect on the performance of less educated workers created by more educated workers working alongside them — inspiring them, instructing them, providing them with good examples, bringing in business for them, etc. If these effects are judged to be significant, if they are positive at the margin, and not just inframarginal, and if they are uncompensated, then a case can be made out on these grounds for taxpayers subsidising part of the cost of education (see Maglen 1976).

(iv) Public Goods

Knowledge and ideas can be regarded as public goods in the sense that one person's possession and enjoyment of them does not in any way diminish another person's capacity to do the same thing. Moreover, once knowledge and ideas have been discovered and developed it is difficult, if not in the long run impossible, to contain them and to prevent their possession and enjoyment by others. The more generally applicable, interesting and valuable knowledge and ideas are, the greater is their degree of publicness.

Teaching and instruction, however, have much more the characteristics of private goods, especially as they are delivered within the confines of schools, colleges and universities. Here they do need to be rationed, since one person's teaching and instruction can easily be at the expense of another's, and, what is more, it is quite possible to exclude people from them completely. This makes teaching and instruction thoroughly amenable to production and delivery through the competitive market system.

Research — the discovery and development of knowledge and ideas — can be a different matter. This is especially the case with 'pure' research — that which advances knowledge and yields ideas that do not have any apparent immediate applicability. Effective pursuit of these relies on private philanthropy, and upon understanding and patient government support.

(b) The Equity Case

Equity arguments have traditionally been at the core of the case for government involvement in the provision and finance of education.

They generally can be classified according to whether public intervention is needed to promote:

- greater equality of opportunity;
- greater equality of incomes; or
- greater equality of consumption.

(i) Greater Equality of Opportunity

The amount and quality of the formal education people are able to undertake have long been recognised as major influences upon their life chances, economically, socially and culturally. Inequalities in access to education therefore, have been seen as one of the crucial determinants of the distribution of life chances, and even though complete equality in the amount and quality of education people are allowed to consume is nowhere considered either practical, enforceable or desirable, free access to at least a minimum amount and quality of education is a common public policy objective. It provides justification for such programs as free public provision of education, the abolition of fees, means-tested living allowances and state aid to private schools.

(ii) Greater Equality of Incomes

Greater equality of opportunity (and its sometimes attendant affirmative action programs) seek to even up the line at the starter's gate. Greater equality of incomes is concerned with narrowing the range of outcomes that can result from the ensuing race. Greater equality of educational experiences — generally pursued through levelling up rather than levelling down — is often considered vital to the achievement of this objective, because of the strong positive association that can be observed between education and earnings. However, whether the educational expansion that goes with levelling up the amount of education people undertake leads to greater equality in the distribution of earnings is not clear (see Maglen 1991).

(iii) Greater Equality of Consumption

Greater equality of consumption is also concerned with narrowing the range of outcomes, but here education is considered primarily as a large expenditure item, that many would not be able to afford if it were left within the household budget. By removing education expenditure from the constraints of the household budget, government funding is not only likely to even up the capacity of people to consume it, but provide households with more disposable income than they otherwise would have. In this respect, government spending on education falls into the same category as spending on public hospitals, public housing, toll-free roads and bridges.

(c) Funding and Provision Options Open to Governments

Figure 1 summarises the various funding and provision options open to society with respect to education. It identifies the polar cases as being:

Figure 1: Education Provision and Funding Options

	Public Funding	**Private Funding**
Public Provision	**State Schools and Universities fully funded out of General Revenue - no tuition fees**	**Options:** 1. User Charges (Tuition Fees, etc) 2. Higher Education Contribution Scheme (HECS)
Either Public or Private Provision	**Options:** 3. Student Assistance Schemes (AUSTUDY, ABSTUDY etc)	**Options:** 5. Student Loans
	4. Vouchers	
Private Provision	**Options:** 6. State Aid to Private Schools 7. Tax Concessions 8. Revolving Fund	**Private Schools and Universities Charging Full Cost Recovering Fees**

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- *Complete public provision/public funding:* education that is wholly provided through government owned and operated schools, colleges and universities, and is fully financed out of general government revenue, so that no tuition fees are charged.

- *Complete private provision/private funding:* education that is wholly provided by privately owned and operated schools, colleges and universities who charge their students full cost-recovering tuition fees.

Figure 1 also arranges the options which are open for policymakers to consider, according to the broad directions they take from the former towards the latter:

- governments can continue as the major education providers, through public schools, colleges and universities, but seek a greater degree of cost-sharing; that is, select options 1, 2 or 5;

- they can use public funds to encourage greater private provision of education; that is, select options 4, 6, 7 and 8; or

- they can seek to encourage both greater private provision and greater private funding of education; that is, they can opt for a combination of the above options.

Note that option 3, that of providing direct assistance to students, can be used in either polar case, or as part of any combination in between.

The following is a brief review of the options identified.

1. *User Charges:* tuition fees, registration fees, administration charges, etc. These could be only nominal charges or they could be full cost-recovering.

2. *Higher Education Contribution Scheme (HECS):* a scheme whereby students pay a portion of the cost of their tuition, either as an up-front contribution that attracts a discount, or as a deferred payment, the rate and timing of which depends upon the student's subsequent earnings levels. The payments are collected through the taxation system. The up-front option is virtually the same as Option 1, while the deferred payment option is really a variant of Option 5.

3. *Student Assistance Schemes:* these can take the form of scholarships, studentships, bursaries or student grants, and can cover tuition fees and other direct education expenses, and/or accommodation and other living expenses. Either or both components can be made subject to a means test on either the students' or their parents' incomes. This option is open to governments to make available to students attending either public or private educational institutions.

4. *Vouchers:* vouchers are a means by which public funds are channelled into the provision of education via the students themselves. They are non-transferable 'claims to grants' issued by a government to all students (or their parents) upon registration, that are redeemable at any approved public or private educational institution, and are capable of supplementation by the students (or their parents) out of their own funds. The recommended basis of their face value is the estimated current per student cost in a relevant 'standard' public institution. All institutions, both public and private, would set their tuition fees at or above this level. If students (parents) opt for the

'standard' public education nothing further needs to be paid. However, those students (parents) that opt for more expensive or different education programs offered by other public and private institutions would have to meet the difference between the fees charged and the value of the voucher. The aim of the scheme is to promote a greater element of choice in education and to make students (and their parents) more aware and responsible in their educational decision-making. The role of government is intended to shift from being that of dominant supplier to the more restricted one of core funder of education.

5. *Student Loan Schemes:* It is recognised that borrowing by students from commercial lenders to finance their education is inherently difficult because the lender cannot establish a lien over the 'asset' being acquired. This 'failure' of capital markets to allocate sufficient funds to this activity gives grounds for governments to either run their own student loan schemes or to act as underwriters of commercially run schemes. In either case they can be short-term small scale schemes confined to helping out students who get into financial difficulties, or longer term more generalised student finance schemes. The most preferred form of the latter is one that offers income-contingent repayment schedules.

6. *State Aid to Private Schools:* This generally comes in two forms — annual recurrent grants to approved private educational institutions, where the size of the grant is determined by a formula based on the institution's own revenue base; number of students, income levels of their parents, and so on — and capital grants, based upon the institution's assessed rebuilding and development requirements. The objectives are to raise the quality of education provided and/or to hold down tuition fee levels.

7. *Tax Concessions:* It is open to governments to reduce the cost burden of both private providers of education, and of students (and their parents) at both private and public institutions, by granting them taxation concessions and exemptions. For private institutions examples include exemptions from sales and payroll tax and from property rates. For students (and their parents) examples include tax concessions on tuition fees and self-education expenses.

8. *Revolving Fund:* Such a fund would be set up through an initial government grant, or government underwritten private program, for the purpose of providing development funds to approved private educational institutions at concessional rates. Being a revolving fund, it is intended that it be self-financing.

(d) Government Involvement in Education in Australia

The following is a list of the major forms of government participation in resource allocation to education in Australia.

- *Provision*
  - — government schools and colleges
  - — public universities

- *Finance*
  - — funding of government schools and colleges, and of public universities
  - — grants to private schools and colleges
  - — student assistance schemes, such as AUSTUDY and ABSTUDY

- HECS
- tax concessions for individuals, tax exemptions for private schools and colleges.

- *Regulation*
  - compulsory education
  - zoning of schools and colleges
  - assessment/certification
  - curriculum development
  - course accreditation
  - registration of teachers
  - fee-charging
  - of numbers, including of particular types and levels of students.

3.2 The Role of Government in Training

(a) Efficiency Arguments

Justification for public funding of training — either to supplement funding by firms and trainees, or to substitute for either or both of these other sources — can also be offered on the grounds of efficiency and equity (see Maglen and Selby Smith 1995). That is, it can be argued that (a) unsubsidised training markets inevitably lead to serious under-investment in training by both firms and individuals, and/or (b) unsubsidised training markets typically restrict access to training to an unacceptable extent, and would be inherently inequitable.

It can be argued that something less than a socially optimal level of resources would be devoted to training by an unsubsidised training market, on the following grounds:

- training generates significant externalities that a purely privately financed training market would fail to take into account;
- training markets would operate under an abnormally high level of 'imperfections'; and
- the provision of training involves significant economies of scale.

(i) Externalities

The contention is that there are substantial benefits that flow from training that are not 'captured' or appropriated by either the trainees — in the form of higher earnings, improved employment prospects, greater job satisfaction and so on — or by the training firms — in the form of higher profits, increased market share, or whatever. Society as a whole also stands to gain in a variety of other ways, so it is argued. However, these extra, external, spillover benefits are generally not taken into consideration by either trainees or firms when they decide how much training to undertake, and, to the extent that they do not, private decision-making will lead to an under-investment in training. Governments, therefore, need to step in with financial inducements to either or both parties to get them to undertake more training.

These claimed external benefits could be of two types:

- those associated with education in general;
- those more specifically generated by training programs.

A priori reasoning suggests the latter are likely to be more significant than the former. The typically narrow focus of training programs is likely to mean that most of their benefits will accrue to either the trainee or the firm, and that fewer of the broader, more nebulous externalities of the kind associated with general education are generated. On the other hand, training much more directly contributes to the skill base of the economy, and to the extent that this enhances the country's overall ability to compete internationally, and to adapt successfully to rapid technological change, then everyone stands to gain from an expanded training sector.

(ii) Market Imperfections

Private provision and financing of training under conditions of *some* uncertainty and *some* imperfections in the labour markets is still able to allocate a socially optimal level of resources to training. What is claimed, however, is that if the uncertainties and imperfections are too great, private markets will allocate too few resources to training. The following examples of where this can happen are often advanced:

- The existence of legislated minimum wages can restrict trainees' capacity to fund firm-provided general training by accepting a much lower wage during the training period. So too can rigidly administered wage structures and/or those that include unduly narrow wage differentials.

- Poaching — this is usually not a problem with specifically trained workers, and is only a problem with generally trained workers if the poaching firm offers a higher wage than the training firm is in a position to offer. This may be the case where there are economies of scale which allow larger firms to poach from smaller firms. (This could help explain why small firms typically provide less training than larger ones).

- A lack of knowledge of the true value of training, by either or both individuals and firms, could lead to serious under-investment (or over-investment) in training. In addition, firms may overestimate the value to them of training undertaken by other firms, in which case they may seek to poach rather than train their own workers.

- Capital market imperfections may present difficulties for both trainees and firms in the financing of training. Lending for training purposes encounters the same difficulties as it does for any other form of human capital investment.

- Workers and firms may be more risk-averse than society as a whole. This may be particularly true of smaller firms and less educated workers.

(iii) Economies of Scale

Firms may not provide enough training (irrespective of whether it is general or specific) because they lack the specialised physical facilities, the specialised managerial, supervisory and instructional expertise, the financial resources or the capacity to cover for employees off the production line while they are undertaking training. These deficiencies would obviously be greater in smaller firms, but may be less of a problem in larger ones. This, too, helps explain why smaller firms typically train less than larger ones.

The further question of whether the provision of the off-the-job component of training can be regarded as a natural monopoly is problematic. That is, whether the economies of scale are so great as to render this aspect of training most efficiently conducted by a large specialised and centralised organisation, such as the TAFE systems in Australia. It seems unlikely, however, that this would be the case across the whole range of courses provided in the TAFE sector.

(b) Equity and Access

The argument is frequently put forward that the training sector plays an important social role in meeting the educational needs of the disadvantaged and unemployed, and those rejected and/or disaffected by general academic education. Some see this role as additional to the sector's economic function of providing, as efficiently and effectively as possible, the skills needed to improve the productivity, adaptability and employability of workers. In this case, the role is referred to as a community service obligation (CSO). Some argue that to the extent that this is a legitimate role for TAFE, a case can be made for it to be costed and funded separately from its economic mission. Making TAFE's CSOs explicit, and funding them separately, minimises the consequences of any incompatibility that may arise between the two sets of objectives, and reduces the inconsistencies and confusions that can become apparent in the pricing of training courses.

However, there is also a view that providing for the educational and training needs of the disadvantaged is an essential part of the training sector's economic function and therefore cannot be separated clearly from it for the purposes of costing and funding. In this view, the development and utilisation of human resources are cast as keys to the efficiency and economic competitiveness on which economic success depends and it is argued that human potential can only be realised if the problems of the disadvantaged are addressed. Increasing equity by catering for the educational and training needs of the disadvantaged thus becomes an important objective of vocational education and training and integral to the sector's fulfilment of its economic function.

(c) Funding and Provision Options Open to Governments

Figure 2 summarises the various funding and provision options open to societies with respect to training. It identifies the polar cases as being:

- *Complete public provision/public funding:* training that is wholly provided through public training establishments and financed out of general government revenue. This more or less characterises the current position with respect to mainstream TAFE courses.

- *Complete private provision/private funding:* training that is wholly provided and funded privately, either by private training establishments selling training programs at full cost-recovery prices, or by private or government-owned enterprises running their own self-contained in-house training programs for their own employees.

Figure 2: Training Provision and Funding Options

	Public Funding	**Private Funding**
Public Provision	**TAFE programs - fully funded out of General Revenue - no Tuition fees** **Options:** 1. Earmarked Taxes 2. Payroll Levy	**Options:** 3. User Charges (Course Fees, etc) 4. Production Activities 5. Contract Training
Private Provision	**Options:** 6. Subsidies to Employers 7. Assistance to Private Providers 8. Tax Concessions 9. Revolving Fund	**Private Training Providers Charging Full Cost Recovering Fees** **and/or** **Fully Funded Private In-House Training in Industry**

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Figure 2 also arranges the options which are open for policy makers to consider according to the directions in which they lead:

- they can keep training squarely within the realm of public provision/public funding, but expand, diversify and/or stabilise the public revenue base for training; that is, select options 1 or 2;

- governments can continue as the major training providers, especially of the off-the-job components of training, but seek a greater degree of cost-sharing; that is, select options 3, 4 or 5;

- they can use public funds to encourage greater private provision of training; that is, select options 6, 7, 8 or 9; or

- they can seek to encourage both greater private provision and greater private funding of training, that is, they can adopt a combination of the above options.

The following is a brief review of the options identified:

1. *Earmarked Taxes:* a dedicated tax base, specifically for the purpose of funding training activities. Examples from other countries include a designated proportion of the import tax on industrial machinery, and a levy on the value of large construction projects. The major virtue of an earmarked tax is that it is easier to predict how much it is likely to yield, and so it brings a greater degree of stability into the planning system.

2. *Payroll Levy:* a tax levied on the payroll of employers, (usually only those with a payroll or a workforce above a certain size, and usually set at a rate between one and four percent). This is the most common type of earmarked tax base for funding training. It has the virtue of being related to human resource development, but the drawback is that it can discourage the employment of labour.

3. *User Charges:* course fees; charges for materials used, accommodation and board, etc.; purchase by trainees of their own equipment and special clothing. These could be only nominal charges or they could be full cost-recovering. As in the case of students still in the formal education system, hardship for poorer trainees can be ameliorated by variants of such schemes as AUSTUDY and ABSTUDY, by deferred payment as under HECS, or through the introduction of a separate subsidised trainee loan scheme.

4. *Production Activities:* TAFE colleges could sell the products and services the trainees produce in the course of their training programs. In addition, these establishments could use their facilities outside of training hours to produce saleable goods and services. All, or a substantial part, of the proceeds from these commercial activities would be retained to augment other sources of funds. While production unit activities can result in greater financial autonomy for training establishments, the danger is that they can also divert them from their main mission and/or distort their training agendas.

5. *Contract Training:* TAFE colleges could develop customised training packages at the invitation of individual employers; they could tender for the right to implement

training programs designed by government departments (such as the various government sponsored labour market programs), state instrumentalities and private corporations; or they could develop a range of options that they market to prospective clients. (TAFE PLUS, an offshoot of the New South Wales TAFE Commission is an example of this kind of operation.) If individual colleges are able to retain all or part of the funds generated by these initiatives they would gain a measure of financial independence from government. Moreover the colleges may be able to more productively employ spare capacity and, as they may be in direct competition with other training providers, (including other TAFE colleges) this would provide them with the incentive to improve the efficiency and effectiveness of their training delivery. The drawback, however, may be that this more lucrative activity could crowd out the mainstream training activities of these establishments.

6. *Subsidies to Employers:* governments can stimulate the provision of in-house training programs among employers by offering grants that are earmarked for, or tied specifically to, their training activities. If not outright grants, this assistance could come in the form of matching grants or discounts on the purchase of government goods and services. One of the advantages of this type of program is that it not only directly increases the amount of training undertaken in industry, it also has an educative effect. Employers have a chance to evaluate the impact of training on the skills of their workforces and on the economic performance of their enterprises. The disadvantages of subsidies are twofold. Unless the eligibility rules are carefully worked out, and the programs closely monitored, the possibilities for inappropriate use of funds can be high. The other problem is that subsidies do not provide a strong incentive for self-reliance. In this respect, matching grants, with their *quid pro quo* arrangements, tend to be more effective than outright grants.

7. *Assistance to Private Providers:* governments may wish to foster the growth of private training establishments, either to provide direct competition with their own training establishments, or in areas or trades and industries that they cannot or do not wish to be active in. Assistance could be financial — such as direct grants, matching grants, subsidised training wages, tax concessions or subsidised loans — or in the form of shared facilities (after hours use of its own training facilities, provision of staff training or seconded personnel).

8. *Tax Concessions:* instead of the range of inducements included under option 6 the government may use its taxation system to provide private employers with the incentive to conduct more of their own training. The possibilities in this direction include exemption from tax of any expenditure related to training activities. The rate of exemption could be anything up to 100 percent or beyond, (such as, for example, a 150 percent deduction for R&D expenditure). Another possibility is the accelerated writedown of equipment and facilities used for training purposes. The same advantages and reservations claimed and expressed about option 6 can be made here.

9. *Revolving Fund:* this is essentially a means whereby the government can provide enterprises with access to development funds at concessional rates, for the purpose of building up their training infrastructure (specifically designed buildings, purpose-built training facilities and equipment, etc.). The revolving fund could also be used to build up the enterprises' training staff, by providing funds for instructor training and development. It is generally not thought appropriate, however, for revolving funds to be used for the financing of training programs *per se*, as these are predominantly

recurrent in nature. The advantage of this option is that, as a loan scheme, in which the enterprises are obliged to fully repay the amounts borrowed, the enterprises have a vested interest in ensuring that the funds are effectively utilised. The disadvantage is that enterprises have a strong incentive to find a way around the fund's regulations, so that they can make use of these concessional loans as a cheap means of financing other projects that have very little training content or instructional value.

Any or all of these options could be taken up simultaneously. They are not mutually exclusive; and combinations are quite common. One of the most frequently adopted ones is that where an earmarked tax, such as a payroll levy, is used to establish a fund out of which assistance is given to enterprises to increase the amount of training they themselves do. Assistance could be of the sort described under option 6, (and possibly option 7) or the fund could be a revolving one. As a further variation and combination of options, and as an incentive for the private sector to be more self-sufficient in training, it could be that those establishments that are already spending an equivalent amount on approved training programs for their employees qualify for exemption from this levy in the manner described under option 8. This, too, has been a common device used in the funding of training. The Training Guarantee Scheme was a very good example.

(d) Government Involvement in Training in Australia

The following is a list of the major forms of government assistance to resource allocation to training in Australia (see also Burke et al 1994, Chapter 6).

- *Provision*
  - TAFE colleges

- *Finance*
  - Australian National Training Authority (ANTA)
  - funding of TAFE colleges
  - Labour Market Programs
  - (Training Guarantee Scheme)
  - AUSTUDY and ABSTUDY for TAFE students.

- *Regulation*
  - Australian Standards Framework (ASF)
  - Australian Qualifications Framework (AQF)
  - Australian Vocational Training Scheme (AVTS)
  - other elements of the National Training Reform Agenda.

4. TREATING EDUCATION AND TRAINING AS INVESTMENTS — THE HUMAN CAPITAL MODEL

The notion of human capital draws a direct analogy with physical capital, and there are many similarities in their treatment by economists, as is clear from Maglen et al (1994).

4.1 Stocks and Flows

It is important to distinguish between the stock of human capital and growth in the stock of human capital. The stock of human capital is the sum of all the useable (productive) skills, knowledge, ideas, talents, aptitudes etc available at any given time. Growth in the stock of

human capital is a *net flow* — that is, the gross flow of additional productive skills, knowledge, ideas etc acquired through education, training and experience, minus the losses through erosion, depreciation and obsolescence of skills, knowledge and ideas. Investment in human capital, strictly speaking, should refer to the net additions to the stock of human capital. Mostly, however, it is taken to be the gross flow.

Like physical capital, human capital is valued for its use in the production of goods and services, and that value is maximised when the stock is fully utilised (no idle capacity) and allocated, in line with its comparative advantage, in a way that maximises its contribution to production. Similarly, investment in human capital is most effective when it maximises the growth in the productive capacity of the stock.

The distinction between the stock of and investment in human capital can be viewed from the perspective of the three major groups of decision-makers in education and training.

Individuals are the only ones who can actually own human capital. Their stock of human capital is their capacity to earn a living, and comprises their native strengths, abilities and energies, plus the accumulated skills, knowledge and ideas they can bring to bear for this purpose. Their investments in human capital include the extra education and training they undertake, and the on-the-job experience they build up. The value of their stock of human capital is greater the more employable it makes them, the higher the income it can enable them to make, the greater the job satisfaction they can experience. Their investment yields a higher return the greater the impact it has upon employability, income and job satisfaction.

Firms are generally the employers of human capital, the ones who make the decisions as to how much and how human capital is used in the production of goods and services. Their stock of human capital is the size and skill composition of their labourforce. The investment they make in human capital is the amount of money and effort they devote to the recruitment and training of their workers. The value of their stock of human capital is greater the more competitive, and hence the more profitable, it makes them. This is determined, in part, by how fully and effectively they utilise their workers. Their investment yields a higher return the greater the impact it has upon competitiveness and profitability.

Governments are major employers of, and investors in, human capital (they are the principal funders and providers of education). Through these avenues, and through the nature and conduct of their general economic policies, they can have a profound effect upon the overall level and course of human capital utilisation and development. A country's stock of human capital is the strengths, abilities and energies of its population and the skills, knowledge and ideas it has acquired. Investment in human capital is via the resources it channels into its education systems and training programs (Chapman and Pope, 1992). The value it gets from its stock of human capital is greater the faster is its rate of economic growth and development, the more able it is to satisfy the material and other aspirations of its citizens. This in turn depends on how fully and effectively it can utilise the skills and knowledge of its citizens and how successfully it can adapt to changing economic and technological conditions.

4.2 Measures of Human Capital

The measurement of the stock of human capital presents formidable difficulties, as does the measurement of the stock of physical capital (Kendrick 1968). Business enterprises, for example, find it difficult to 'own' and record their investments in human capital in the same way that their accounting records document investments in buildings and equipment. The

lack of such information means that there is a risk of either significantly underestimating the importance of human capital vis a vis physical capital, or of over-inflating its value.

What is required is the measurement of the productive capacity of people. There are two possible approaches to this: one is through *inputs* — estimating the accumulated investments in education and training — and the other is through *outputs* — estimating the contribution to production made by the stock. There are also two means of measurement — *physical* and *monetary*. Together they provide the following range of measures.

Physical input measures:

- years of schooling and training
- a weighted index of qualifications
- a standardised range of competencies

Monetary input measures:

- accumulated expenditure, in real terms, on education and training (for individuals and society)
- accumulated expenditure, in real terms, on recruitment and training (for firms)

Physical output measures:

- the present and estimated future contributions to output made by a stock of a given size and composition

Monetary output measures:

- the discounted present value of present and estimated future contributions to the value of output, adjusted for likely future price movements.

Each measure places a different value on the stock of human capital, and none is ideal. The problems of measuring investments in human capital, from any of the four perspectives, are not as severe as they are in estimating stocks. The same range of measures are available and, not surprisingly, considerably more empirical work has been conducted on investments. Maglen (1993a) provides a recent survey of this work. Much of this has focussed on investments by individuals and by society as a whole. Little has been done from the perspective of the firm, and those from a government perspective are usually confined to monetary input measures.

4.3 The Key Linkages

The key linkages in the human capital model are between:

(i) *education and worker productivity* — education makes workers more productive by transmitting to students cognitive skills that can be applied to their jobs when they enter the workforce; and

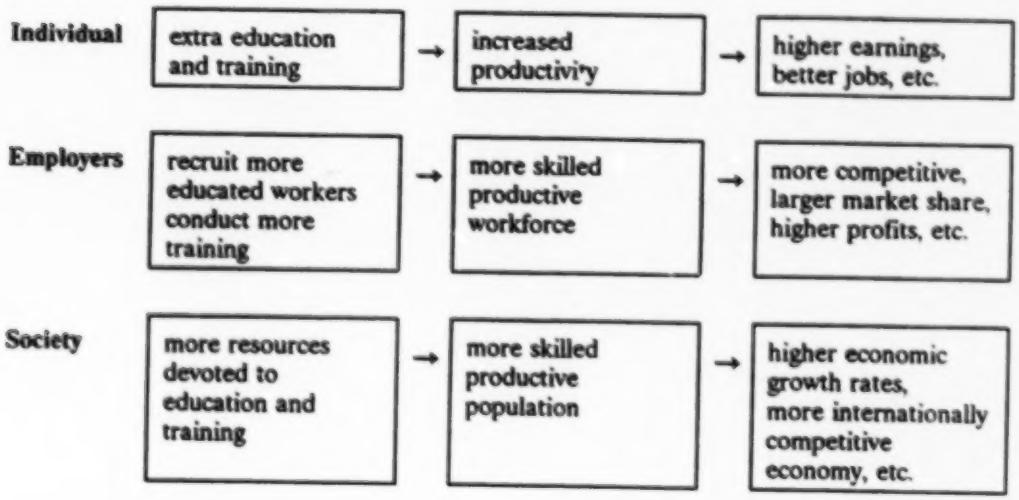
(ii) *productivity and earnings* — competitive labour markets ensure that rational profit-maximising employers reward workers whose (marginal) productivity is higher with a higher wage than those whose (marginal) productivity is less.

The model assumes that labour markets clear primarily through movements in wage rates, and that they act essentially as arenas in which previously acquired (through education)

productive skills are bought and sold.

From the perspective of the three key decision-makers the model can be depicted thus:

Figure 3: The Human Capital Model


Individual
extra education and training
increased productivity
higher earnings, better jobs, etc.
Employers
recruit more educated workers conduct more training
more skilled productive workforce
more competitive, larger market share, higher profits, etc.
Society
more resources devoted to education and training
more skilled productive population
higher economic growth rates, more internationally competitive economy, etc.

4.4 Rates of Return

Studies of the rate of return to education provide a means of expressing the costs and benefits of education on a basis that enables comparison of the value of additional investment in education with investments in other fields (Maglen 1994a). Rate of return calculations have been made in many countries for investments in education, from both the individual and social perspectives. Calculations from the perspective of employers, and for investments in on-the-job training, are not common.

Estimates of the private (individual's) rate of return to education involve calculating the net stream of present and future per student costs and benefits associated with a given level and type of education, and then finding the discount rate that sets the present value of that stream at zero. The principal cost items are tuition fees and other out-of-pocket expenses, together with the estimated net earnings students forego, on average, while studying, amended to take account of AUSTUDY, the probability of unemployment, drop-out, and so on. Benefits are measured by the age-specific earnings differentials, net of tax and HECS, associated with extra education, also amended for the probability of labour force participation and unemployment. Such calculations usually reveal that private rates of return to education are higher for primary and secondary education than for tertiary study. In general, private rates of return have tended to fall in the face of educational expansion, but generally have remained either above or comparable to the rates on other private investments (Maglen 1993).

Social rate of return calculations employ the same techniques, and many of the same data sources as the private calculations. The main differences are that, on the cost side, full resource costs per student place have to be estimated and, on the benefit side, gross rather

than net earnings differentials are used. Some studies also attempt to include measures of externalities – those social benefits of education such as political stability and widespread literacy – that are not captured in private earnings. However, the big problem with social rates of return to education is that of other monetary output measures, namely, that they have little validity unless it can be assumed that earnings differentials accurately reflect productivity differences due to education. As will be noted in the next section, that assumption cannot be made with any confidence; thus it is hardly surprising that few social rate of return studies are conducted these days. Those conducted in the United States, however, show that while social returns are generally not as high as the private rates of return to the same levels and types of education, they nonetheless compare favourably with investments in physical capital (Leslie and Brinkman 1988).

5. ASSESSING THE CONTRIBUTION EDUCATION AND TRAINING MAKE TO ECONOMIC PERFORMANCE

5.1 Education and Productivity

Does having a better education make a worker more productive, as the human capital model would have it, and does having a more educated workforce improve the performance of firms, and lead to faster economic growth of a country? A large number of studies, mostly from outside Australia, can throw light on these issues. The following summary of available evidence draws upon Maglen et al (1994), which itself was based upon a survey conducted in Maglen (1993).

- *Evidence Employing Physical Output Measures*
  - *From the individual and firm perspective:*
    - of productivity gains from extra education;
    - of more educated workers being more adaptable to change;
    - from intercountry comparisons of occupation and industry;
  - *From the social perspective:*
    - from observations of growth rates over time;
    - from comparisons of growth rates between countries;
    - from international comparisons of adaptability;

- *Evidence Employing Monetary Output Measures*
  - *From the individual perspective:*
    - age-education-earnings profiles
  - *From the social perspective:*
    - of earnings and productivity linkages;
    - from earnings functions;
    - from social rate of return calculations;
    - from growth accounting exercises.

(a) Physical Output Measures from the Individual and Firm Perspective

(i) Productivity Gains

What is required here is comparison of the productivity of workers with different levels of education employed in the same occupation. Productivity comparisons of workers in different occupations are extremely difficult since it is often not possible to standardise for differences in job design and the nature of the end product.

Given this constraint it is not surprising that there is little evidence of this type. What there is is largely confined to agriculture, in developing countries, and to comparisons between workers with no education and those with a few years of primary schooling (see Lockheed et al 1980, and Lockheed 1987). This shows that, in general, agricultural workers in developing countries who are basically literate and numerate are more productive than those who are not. However, this is scarcely relevant to the issue of whether undertaking higher education in Australia adds to the productivity of those who go on to work in manufacturing and the service industries. A small number of studies outside agriculture have been conducted in the United States; but these have been confined to workers in semi-skilled occupations. Even so they have not provided strong support for the proposition that more education leads to higher productivity (Horowitz and Sherman 1980; Weiss 1988). The pattern of work organisation is particularly important — extra education is unlikely to produce productivity gains if work is organised in such a way that the new skills are not used.

(ii) Greater Flexibility

Agriculture again provides the major source of evidence, this time from the US cornbelt (Wozniak 1987). It shows that educated farmers generally are more responsive to such things as price changes and technological developments, although whether this always leads to greater productivity or profitability is left open. Bartel and Lichtenberg (1987) come up with similar conclusions from their broader cross-section/intertemporal study. These findings are important because they are suggestive of particular aspects of education that can enhance worker flexibility — the ability to seek and use new information, and to evaluate critically the likely impact of new developments.

(iii) Intercountry Comparisons of Occupations and Industry

In a category of their own are the series of studies conducted by Prais and colleagues at the National Institute of Economic and Social Research in the United Kingdom. From the beginning of the 1980s they undertook a series of detailed studies of the education and training experiences of workers in a range of British industries compared to those of workers in the same occupations and industries in West Germany, France and Japan.

The overall pattern to emerge was that British industry was doing comparatively poorly — on a variety of indicators, average labour productivity amongst them — not so much because of the amount of education British workers have received, but because of the generally poorer quality of that education, especially in basic mathematics and science, and the inadequacy of much of the training they receive once they are employed (Prais 1989).

These findings emphasise the important point that investments in education are not homogeneous in their impact: a dollar spent on one type of educational input or program may yield a different economic outcome from a dollar spent on another (Chapman and Pope 1992).

(b) Physical Output Measures from the Social Perspective

(i) Economic Growth

The proposition of the full-year full-time workforce in Australia with post school qualifications rose from less than 25 per cent in 1968-69 to over 50 per cent in 1992-93 (those with degrees increased from less than 4 per cent to over 13 per cent). Over the same period the rate of increase in average labour productivity — as measured by the changes in real GDP per person employed — declined. Table 1 shows that the rate of increase slowed down from an annual average of around 2.7 per cent in the 1960s to 2.3 per cent in the early 1970s, and to only 1.3 per cent over the 1980s. There are a number of possible explanations for the slowdown in the rate of growth in labour productivity, including the fact that Australia's stock of physical capital did not keep pace with the growth in employment. Other measures did not fall as consistently as this key indicator over the same period. However, none of the indicators accelerated in the way that such dramatic changes in the educational qualifications of the workforce could have led us to expect.

Table 1: Average Annual Rates of Change in Full-Year Full-Time Employment (per cent per annum) and Selected Economic Performance Indicators, Australia, 1960-1989.

	1960-68	1868-73	1973-79	1979-86	1986-89	1960-89*
Full-year full-time workers by educational qualifications:						
degrees:						
any post-school	n.a.	6.1	11.7	7.5	2.9	8.3
no post-school	n.a.	4.7	7.0	2.4	4.1	5.2
Total	n.a.	-1.5	-5.5	-0.7	0.5	-1.8
Real GDP	n.a.	1.0	-0.6	1.5	2.2	0.8
Real GDP per capita	5.0	5.6	2.7	2.7	4.3	4.0
Real GDP per person	3.0	3.6	1.5	1.3	2.6	2.3
employed	2.7	2.3	1.7	1.7	0.5	1.8

Note: * For Employment figures 1968 to 1986.

Source: Maglen et al (1994) Table 5, page 174.

(ii) International Comparisons of Growth Rates

Inter-country macro-comparisons were an early favourite amongst researchers endeavouring to quantify the relationship between education and economic performance. Their limitations were also well recognised early on, and very little of real substance can be drawn from exercises of this nature. Blaug (1970) provides a detailed run-down of the difficulties encountered in conducting them and in interpreting their results. Nevertheless, international comparisons of educational effort continue to be popular among those who are looking to find reasons for Australia's poor productivity record and relatively low economic growth rates.

Table 2 illustrates quite clearly the difficulties of drawing any concrete conclusions using this approach. It shows that there is little if any relationship between any of the standard quantitative performance levels and economic growth indicators. Indeed, the clear leader in the education stakes on virtually every count is the USA, but their labour productivity growth record is even more dismal than Australia's. On the other hand, those who have performed better economically than either Australia or the USA present a mixed picture with respect to their educational statistics.

A particular trap in this area is the temptation to use observed differences in the nature of national education systems as key explanatory variables for national economic performance. It is drawing a very long bow to attribute differences in national educational performance to differences in school structures or resources, and it is drawing an even longer bow to attribute national economic performance to differences in national education indicators. The factors that shape student learning and influence the ways in which learning is translated into productive work are heavily bounded by complex cultural factors that are difficult to conceptualise and measure, let alone transfer across national borders.

(iii) International Comparisons of Adaptability

Easterlin (1981) is concerned with the broad sweep of history. He concluded that the spread of technology depended crucially upon attitudes to change and the ability to cope with it that are developed by education. A necessary pre-condition of successful technological diffusion is the modernising influence brought by the spread of formal education.

Both Ergas (1984) and Porter (1990), in his famous treatise on the competitive advantage of nations, drew attention to the importance of education and training. Ergas examines the relative performances of the larger OECD countries in technological innovation and seeks to identify the factors causing differences between them. In doing so he concedes the enormous difficulties involved in comparing skill levels, their acquisition and utilisation across countries. He does, however, conclude that education and training are somehow crucial and that the development of strong links between higher education and industry (the one supporting the other) are important. Similarly vague declarations of the importance of technical education and vocational training, and of business and tertiary education institutions working closely together emerge from Porter's book as well but, whereas Ergas tries to quantify relationships, Porter does not. Stevens (1986) deals much more explicitly with the links between a country's education and training effort and its ability to cope with technological change, but even he finds the picture a complex one that does not lend itself to simple remedies.

(c) Monetary Output Measures from the Individual Perspective

Monetary output measures are based upon the universally observed positive relationship, on average and in all age groups, between extra education and extra earnings. This relationship is exemplified in the cross-section age-education-earnings profile for Australia. For individuals, increasing their earnings capacity is thus a major investment benefit derived from their education. It is also well documented that educated workers experience higher labour force participation and lower unemployment rates, which are further factors contributing to the generally high private rate of return to education.

Table 2: Growth in Real GDP Per Person Employed, and Selected Education Indicators

	Australia	USA	Japan	W. Germany	UK
Average annual rates of growth in real GDP per person (per cent per annum)					
1960-86	1.9	1.2	5.5	3.2	2.2
1979-86	1.7	0.9	2.8	1.5	1.9
No. of first degrees awarded per million of population: 1982	2550	4100	3250	1200	2000
No. of post-graduate degrees awarded per million of population: 1982	845	1700	170	260	380
Proportion of labour force with degrees: (per cent) 1982	8	19	13	8	7
Participation rate in education of population age 16-24 (per cent) 1982	36	73	54	45	40
Proportion of new university entrants enrolled in technology disciplines: (per cent) 1975	7.4	14.3	19.5	12.9	21.5
Proportion of new higher education entrants in below degree level technology disciplines: (per cent) 1982	10.1	21.3	4.7	41.1	n.a.

Source: Maglen (1990), Table 2, page 285.

(d) Monetary Output Measures from the Social Perspective

These measures are also based upon age-education-earnings profiles but whether they have any validity depends entirely upon whether productivity differences are reflected in earnings differences, and *vice versa*. The theoretical arguments, and the empirical evidence, in support of this crucial link between earnings and productivity, however, are at best only problematical (Maglen 1990).

There is surprisingly little direct evidence that the earnings-productivity link exists, and most economists are content to assume it rather than demonstrate it. Major surveys of the economic role of education conducted over the last two decades have done the same (for

example, Leslie and Brinkman 1988). Gottchalk (1978) and Medoff and Abrahams (1981) appear to be the only ones who have actually tried to establish the link. Both reported largely inconclusive results. These weaknesses greatly limit the value of monetary output measures of investment in human capital.

(i) Earnings Functions

Earnings functions can be used to test whether education is an investment in human capital or whether it merely acts as a screening mechanism used by employers when recruiting workers. If, for example, they revealed earnings correlated more highly with cognitive skills than with ability, then this would lend support to the human capital view, since cognitive skills are acquired chiefly through education and training. Ability, on the other hand, is only screened by education. The study of Boissiere et al (1985) attempts this sort of exercise. Their analysis revealed direct returns (in terms of earnings) to reasoning ability to be low, those to years of schooling to be moderate and those to literacy and numeracy to be high.

These results suggest that at the basic levels of cognitive skills, education plays a significant human capital role. However, whether it continues to do so at the higher levels of cognitive skills required in more advanced occupations in more industrialised economies is another matter (Fägerlund 1987); Winkler 1987).

(ii) Growth Accounting Exercises

The assumption that earnings differences accurately reflect productivity differences between workers lies at the very heart of most attempts by economists to measure the contribution of education to economic growth. Faith in the existence of strong education-productivity-earnings linkages has allowed calculations of the contribution of education to economic growth, of often breathtaking precision, to be made and to go largely unchallenged.

Work by Schultz (1961) and Denison (1962) pioneered attempts by economists to isolate and calculate the contribution educational expansion was able to make to improving the quality of the workforce, and hence to economic growth itself. Indeed it was Denison's estimate that was largely instrumental in creating 'the human capital revolution in economic thought' (Blaug 1970). This suggested that the increased educatedness of the US workforce over the period 1929 to 1957 contributed 23 percent of the growth in national income over the same period — a contribution larger than that of the growth in the stock of physical capital, and second only to that of the workforce itself.

Few subsequent studies in the USA were able to match the contribution from education that Denison's original work produced (Maglen 1993a). His own estimates for later periods were more modest, except for the mid-1970s when it seems education made a huge contribution, even though output per person employed came to a halt (and fell in some years).

Application of growth accounting techniques to the rest of the world hardly give education a key role in the growth process. Estimates for Japan and West Germany are so low as to be virtually insignificant, and even for other countries in Europe that matched or surpassed the USA growth rate over this period the estimated contribution of education was very small.

5.2 Education as a Screening Device

An alternative explanation of the economic role of education and training is provided by the so-called 'screening hypothesis'. While it too allows for a positive association between extra education, higher productivity and increased earnings it does not posit causal relationships between them as does human capital theory. The hypothesis, therefore, is not as challenged by the general lack of evidence substantiating the links as is the latter.

The screening hypothesis forms the core of a cluster of alternative explanations of how labour markets work, and of the role that education and training play in them. The following set of basic propositions underlying these alternative explanations is taken from Maglen (1993), but see also Maglen (1985) and Blaug (1983).

- most labour markets, especially those in which more educated workers seek employment, are not so much markets in which prepackaged productive skills are bought and sold, as elaborate sets of markets for training slots;

- job-seekers do not compete for these slots on the basis of the wages they would be willing to accept, but on the extent to which they can signal to employers that they are suitable trainees, that they would cost the least to train;

- most job-related cognitive skills are acquired on the job through training and experience, rather than through pre-employment (general or vocational) education;

- most organisations fill most of their job vacancies from within their current workforces. Existing employees generally cost less to train than outsiders, since they are already familiar with what is required. Indeed, among their tasks as employees the understudying of their superiors' jobs and the training of subordinates to fill their own. Internal job applicants signal their suitability by demonstrating how well they have performed these tasks;

- outsiders are recruited generally at the lower levels of organisational structures (employment hierarchies) and signal their suitability for training with well recognised and reliable indicators. Chief among these are their educational qualifications;

- an important function of educational programs is to inculcate, develop and/or sort out the non-cognitive affective behavioural traits among students that will render them suitable trainees, rather than to provide them with a collection of ready made vocational (cognitive) skills;

- there is a strong positive correlation between education and training — the two are complementary rather than substitutes, so that more educated workers tend to undergo more on the job training than less educated workers;

- productive potential resides primarily in the jobs to which workers are assigned, not in the workers themselves, so that when workers switch jobs their productive potential perforce changes;

- actual labour productivity is indeterminate, since jobs are typically formed into clusters or teams (departments, sections, etc.), and it is to the team rather than the individual job that productivity is attributable;

- a worker's contribution to the team's productivity (and hence the overall level of productivity of the team itself) depends upon the cooperation of team-mates and upon motivation, and the latter in turn can hinge upon the pattern of wage relativities within the team itself; and

- wages are assigned to jobs not to workers, and are related to one another more through the need to preserve wage justice, and hence maintain good industrial relations, than in response to competitive market forces. These may bring about changes in wage relativities in the long run, but rarely in the short run.

This alternative 'model', therefore, challenges the straightforward linkages of the human capital model:

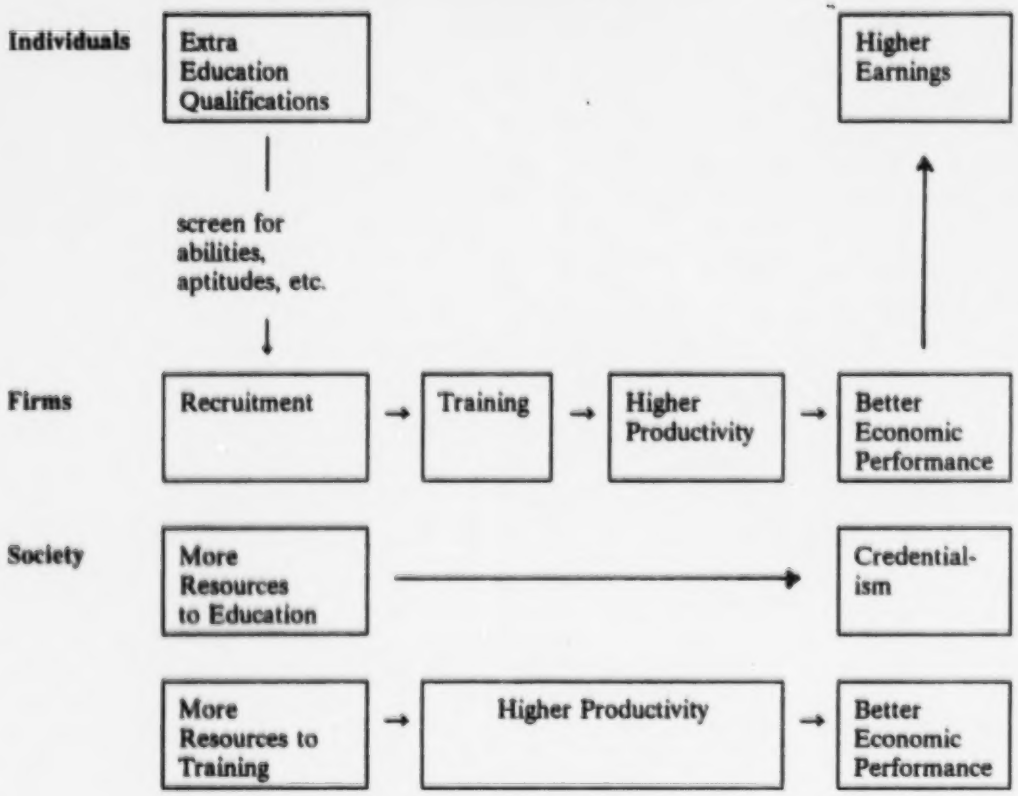
- *the education-productivity link:* the alternative model maintains that education does not make workers more productive. Productivity resides mainly in the job, and workers learn most of the cognitive skills required to perform that job through employment-related training. Education programs mainly serve to screen students for the abilities, aptitudes and attitudes that enhance their trainability. Along the way however, they may also provide some generally useful (cognitive and non-cognitive) skills as well — e.g. communication skills, computer literacy, foreign languages, knowledge of scientific method, engineering principles, good work habits, etc.

- *the productivity-earnings link:* in the alternative view there may be an association between these since both are assigned to the job by the employer, and *one* of the criteria used in determining the rate for the job no doubt will be the assessed worth of that job to the organisation. The link, however, may not necessarily be strong or as automatic as the human capital model assumes — particularly if productivity is attributable more to the team than the individual job, and earnings are geared to the maintenance of harmony within the team.

For the individual extra education could still lead to higher earnings — but by he/she being assigned to a better job rather than because of his/her greater inherent productivity.

For society educational expansion will have no direct effect upon labour productivity and hence upon economic growth. Indeed, if educational expansion outstrips the growth in jobs usually filled by those with more education, the result is credentials creep — the process of credentialism. Figure 4 provides a depiction of the model.

Figure 4: The Screening Model



5.3 Education and Training in the New Growth Economics

In recent years there have been major developments in economic theories of growth (see, for example, Romer (1986), Lucas (1988), Scott (1989), Barro (1991)), in response to the relatively poor performance of conventional theories in explaining long term growth rates, and to the criticism that the conventional theories treat the most important determinants of growth as exogenous. The new endogenous growth theories emphasise the importance of externalities and market imperfections, and hence accord to government a much more substantial and positive role in the growth agenda than do the conventional neo-classical explanations of growth. Investments in human capital, chiefly through education and training, are seen as playing a pivotal role, along with investments in physical capital and in research and innovation.

The new growth theories appear to incorporate many of the features of education and training discussed in this paper.

> 'Human capital is important because it both helps produce the new knowledge that leads to growth and it helps firms take advantage of knowledge provided as a public good by the action of others.

> However, general education by itself is not enough to ensure that growth occurs. The knowledge that is required appears to be that which is related more closely to the production process. How close, however, is not yet clear from the literature. The knowledge that firms possess needs to be general enough to enable as many knowledge externalities as possible to be appropriated, but specific enough to allow the knowledge gained to be put into practice.
>
> Impediments in capital and labour markets might inhibit the growth of human capital by discouraging individuals from investing in their own human capital. Sub-optimal investment in human capital might also arise from the fact that there are so many externalities generated that any one firm cannot appropriate a great enough return to make the investment worthwhile ..... These two problems might be overcome by government intervention. However, the new growth literature gives little additional guidance in this regard.' (BIE (1992) page 57).

The new growth theories appear as yet to be short on specifics. They certainly revive the cause of human capital, by giving it one of the key endogenous roles in the economic growth process. Moreover they link together two sets of issues previously treated as largely being separate, namely, those to do with education and training as investments, and those concerned with governments' roles in their funding and provision. However other issues remain unresolved.

As Burrell (1994) observes:

> 'Surrounding these "human capital" models (of Romer, Barro, Lucas and others) is not only a debate about the relationship between, and the relative importance of, human and physical capital formation, but also the question of the optimal form of this investment and the role of government in it. One aspect of this is the question of whether it is general education or more focussed technical and scientific education which has a bigger impact upon knowledge formation and growth. Other issues include the impact of taxation policy and inefficiencies in capital and labour markets on investment in human capital.' (page 119).

5.4 Globalisation of the World Economy and Its Impact on Education and Training

Most of the discussions about the roles education and training play in the economy take two things more or less for granted — (a) the continuation of the economic status quo, so that economic growth essentially means more of the same, and (b) the content of education and training programs, whether they be academic or vocational, general or specific, can be taken largely as given.

The recent phenomenon of globalisation of the world economy threatens both of these assumptions. It is a process that is bringing about profound shifts in economic relations within and between countries, and it is focussing much more attention on the skills, knowledge and ideas that education and training programs ought to be providing for the workers of the future.

Globalisation has been described as '..... a set of conditions in which an increasing fraction of value and wealth is produced and distributed worldwide, through a system of interlinking private networks' (OECD 1992, p.210; see also Reich 1991 and Naisbitt 1994).

The process has been characterised by rapid changes in information technology and their integration into corporate planning and operations; deregulation and integration of the world's financial markets; and the emergence of worldwide networks of corporate forms that operate under and between the umbrellas of large multinational corporations. The upshot has been a sharp rise in the proportion of world trade in the form of intermediate goods, often as intrafirm transfers, as corporate networks source different aspects of their procurement, production, distribution, marketing, financing and research and development operations in different parts of the world, in the quest for comparative advantage and the competitive edge. In this international specialisation and division of labour, advanced industrialised high cost countries are tending to switch away from high volume production of standardised products towards the production of high value-added goods and services, while the former is increasingly being relocated to low labour cost (and often less regulated labour market) sites in developing countries.

The impact this is having upon employment patterns worldwide is striking. Reich in his study *The Work of Nations: A Blueprint for the Future* (1991) identifies three broad groups of workers, each of which are experiencing different fortunes in the emerging global economy:

- routine production workers;
- in-person service workers; and
- symbolic analysts.

The following is a brief summary of their characteristics. A fuller description can be found in Reich, and in Maglen (1994b).

- *Routine Production Workers* — those involved in routine repetitive work generally associated with high volume production of standardised products. They include many of the blue collar jobs on assembly lines, in factories, farms, mines and mills, as well as clerical and administrative jobs in offices. They also include their foremen, supervisors and line managers. Routine production workers have a high degree of exposure to global competitive forces.

- *In-Person Service Workers* — those whose primary task is dealing face-to-face with the ultimate beneficiaries of their labours — be they customers (or suppliers), clients, patients, patrons, pupils or passengers. Some of their work can also be routine, but it ranges across a broad spectrum of employment — in tourism and hospitality, retailing, personal services, health care, community and social work, law and order, child care, primary and secondary schooling, passenger transport, domestic housekeeping and maintenance, etc. In-person service workers are largely insulated from global competitive forces.

- *Symbolic-Analysts* — so-called because their work mostly involves the manipulation of symbols — data and words, oral, audio and visual representations. Their primary tasks are conceptual, involving critical and creative thought. They are problem identifiers, problem solvers and strategic brokers. They develop ideas and translate them into marketable propositions. Like routine production workers symbolic analysts have a high degree of exposure to global competitive forces.

As the pace of globalisation picks up, we can expect to observe significant shifts in international patterns of employment amongst these three groups of workers and the effects of this will obviously be felt in Australia (see Maglen 1994b).

More and more of the world's high volume production of standardised products is being located in the low wage economies of China, South Asia, Latin America and Africa. This has led to a rapid expansion of employment of routine production workers in those regions, and to the stagnation and decline in employment opportunities elsewhere. While Australia's per unit labour costs have tended to decline in recent years, they are generally still high by global standards, and so the growth prospects for its routine production workers have not been good, except perhaps in those areas of early stage manufacturing in which it has a comparative advantage (wool textiles, food processing, metals). Even the prospects for white-collar routine production workers in Australia have not been bright, as more and more of their jobs are eliminated through automation and the organisational restructuring that has been occurring, in part, in response to the globalisation process.

The switch in more advanced countries is to high value production of goods and services — the area of greatest growth in the world economy. In this arena international competition is largely between symbolic analysts, and increasingly the continued prosperity of advanced countries depends upon how successful their symbolic analysts are at winning part of that production for themselves. The more successful they are, the more integrated into the world economy their countries become, with more and more global organisations locating part of their operations within their borders. This in turn makes them even better placed to share in the growth of the high value production. To a certain extent Australia has been able to participate in this lucrative aspect of the globalisation of the world economy. Employment of its symbolic analysts is growing comparatively quickly, and their incomes are growing relative to those in the rest of the workforce.

In-person services are an important source of employment, especially on a part-time and casual basis, and especially for women. However, with the exception of those involved in the international tourist industry, employment and income prospects for these workers depend critically upon how well the other two groups are able to compete in the global economy. Given the gloomy prospects for routine production workers in Australia, this means that much of the growth in both the employment and incomes of its in-person service workers rests upon the performance of the country's symbolic analysts. It is hardly surprising to find that employment and incomes of Australia's in-person service workers are growing faster than those of routine production workers, but not as fast as those of symbolic analysts.

In the light of these developments economists need to reassess the ways in which they have approached the analysis of the role of education and training in the economy. It will take them into unfamiliar territory, for what appears to be of increasing importance to the economic performance of individuals, employers and the country as a whole, is not so much the *amount* of education and training undertaken, nor the *types* of education and training programs developed, but their *quality*. And this will be assessed in terms of how well they are able to cultivate among students and trainees the appropriate attitudes and attributes of successful symbolic analysts and in-person service workers.

Those who will make it as successful symbolic analysts will need to be highly creative, good at critical analysis, flexible, innovative, risktaking, able to conceptualise, capable of lateral thinking, competitive and entrepreneurial. Successful in-person service workers are required to be articulate, friendly, courteous and caring. Without these attitudes and attributes the amount and type of education and training they undertake will be less than effective.

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